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DOCKET NO. D-1996-011-3

DELAWARE RIVER BASIN COMMISSION

**Evonik Degussa Corporation
Industrial Wastewater Treatment Plant
City of Chester, Delaware County, Pennsylvania**

PROCEEDINGS

This docket is issued in response to an application submitted to the Delaware River Basin Commission (DRBC or Commission) by IES Engineers on behalf of the Evonik Degussa Corporation on March 9, 2011, and amended on April 4, 2012 by submittals from HydroQual and IES Engineers, for review of an industrial wastewater treatment plant (IWTP) renewal and expansion/modification (Application). The Pennsylvania Department of Environmental Protection (PADEP) issued National Pollutant Discharge Elimination System (NPDES) Permit No. PA0051713A1 for the existing IWTP discharge on February 19, 2008. On April 3, 2012, the docket holder submitted an NPDES application to PADEP to expand the discharge of its IWTP. PADEP is currently processing the NPDES application.

The Application was reviewed in accordance with Section 3.8 of the *Compact*. The Delaware County Planning Department has been notified of the pending action. A public hearing on this project was held by the DRBC on September 12, 2012.

A. DESCRIPTION

1. Purpose. The purpose of this docket is to approve the renewal and modifications to the discharge from the Evonik Degussa Corporation (Evonik) industrial wastewater treatment plant (IWTP). The project consists of: 1) the addition of new wastewater facilities to the existing IWTP, including a wastewater sump tank, heat exchanger, static mixer, cyclator, and neutralization tank; 2) a replacement of the existing 12-inch diameter outfall pipe and vertical multi-port diffuser with a new, 12-inch diameter outfall pipe and horizontal, multi-port diffuser; and 3) an expansion of the average annual design capacity from 1.15 million gallons per day (mgd) to 1.8 mgd. This docket also continues a Total Dissolved Solids (TDS) Determination of

a monthly average effluent concentration limit of 30,000 mg/l and daily maximum effluent concentration limit of 32,000 mg/l.

2. Location. The Evonik Chester facility is located between Front Street and the Delaware River, ½ mile northeast of the Commodore Barry Bridge, in the City of Chester, Delaware County, Pennsylvania. The facility will continue to discharge treated industrial process wastewater, non-contact cooling water (NCCW), and stormwater to Water Quality Zone 4 of the Delaware River from two (2) outfalls at River Mile 82.2.

The existing project outfalls are located as follows:

DELAWARE RIVER OUTFALLS	LATITUDE (N)	LONGITUDE (W)
Existing 001 (IWTP)	39° 50' 8.0"	75° 22' 7.9"
Existing 002 (Stormwater)	39° 50' 7.5"	75° 22' 16"

The proposed new project outfall is located as follows:

DELAWARE RIVER OUTFALL	LATITUDE (N)	LONGITUDE (W)
Proposed 001 (IWTP)	39° 50' 12"	75° 22' 18"

3. Area Served. The Evonik IWTP will continue to serve the silica production and processing operations at the Evonik Chester facility. For the purpose of defining the Area Served, Section B (Type of Discharge) and D (Service Area) of the docket holder's Application are incorporated herein by reference, to the extent consistent with all other conditions contained in the DECISION Section of this docket.

4. Physical features.

a. Design criteria. The Evonik IWTP currently treats industrial process water and non-contact cooling water generated from silica manufacturing operations. The treatment process includes pH neutralization, cooling through heat exchangers, polymer addition to static mixers to increase flocculation and sedimentation, clarification in cyclators which employ centrifugal force action, further neutralization, and equalization. The IWTP is designed hydraulically to treat and discharge an annual average flow of 1.15 mgd. The project proposes to expand its hydraulic design capacity to 1.8 mgd by adding additional treatment components similar to the existing components, and modifying the existing outfall, as described in the Facilities section below. The IWTP currently operates at a flow of 0.85 mgd (2011 average monthly flow).

b. Facilities (IWTP). The existing IWTP facilities include two (2) wastewater collection tanks/sumps with pH neutralization, two (2) centrifugal pumps, three (3) heat exchangers, two (2) static mixers with polymer addition, two (2) cyclators, two (2) neutralization tanks, and one (1) equalization tank.

The existing outfall consists of a 12-inch diameter pipe extending approximately 300 feet into the Delaware River, supported by an existing pier. At the end of the pier, the outfall pipe bends 90 degrees in a downward direction, where it submerges into the River, vertically along and attached to the end of the pier. The submerged portion of the outfall pipe contains an multi-port diffuser attached to the end of the outfall for the discharge of the IWTP effluent. This existing diffuser is vertical and contains five (5) ports, spaced 18 inches apart, with the uppermost port located approximately one foot below the mean low water elevation and the lowermost port approximately 5.5 feet above the bottom of the River.

The proposed changes to the IWTP include: the addition of one (1) wastewater collection tanks/sump with pH neutralization; one (1) centrifugal pump; one (1) heat exchanger; one (1) static mixer with polymer addition; one (1) cyclator; and one (1) neutralization tank.

The docket holder also will be replacing the existing 12-inch diameter outfall and 5-port vertical diffuser with a new, 12-inch diameter outfall pipe and 3-port, 18-inch diameter horizontal diffuser. The new outfall will run along the existing pier, similar to the existing outfall. Prior to the end of the pier, the outfall pipe will bend 90 degrees in a downward direction, vertically into the River, under the pier. When the vertical portion of the new outfall pipe approaches the River bottom, there will be another 90 degree bend that sends the outfall pipe horizontal, at which point a diffuser will be attached to the end of the outfall. The new diffuser will end at a location similar to the existing diffuser; however the new diffuser will be horizontal and located under the pier, as opposed to the vertical orientation of the existing diffuser, which is attached to the end of the pier. The new diffuser is 18 inches in diameter and 32.8 feet (10 meters) long, oriented perpendicular to the predominant river flow direction. The diffuser ports will contain three (3) 5-inch diameter ports, spaced 16.4 feet (5 meters) apart, with the ports discharging three (3) feet above the River bottom. The new diffuser will be located close to the bottom of the River and aligned perpendicular to the shoreline and ambient currents in order to maximize mixing of the effluent with the River. The diffuser ports will be oriented vertically up towards the surface in order to maximize the travel time of the plume to contact with the bottom since the effluent discharge is denser than that of the River.

Prior facilities and processes for the IWTP at the Evonik Chester facility have been described in the DRBC Dockets Nos. D-1996-011-1 and D-1996-011-2, approved by DRBC on December 11, 1996, and September 27, 2006, respectively.

The docket holder has the ability to haul wasted sludge off-site by a licensed hauler for disposal at a State-approved facility; however, the majority of the sludge generated by the IWTP is returned to the treatment system.

Several of the project facilities are located in the 100-year floodplain. The Commission's *Flood Plain Regulations* (FPR) has requirements for treatment facilities in the flood plain; however, the FPR only apply in the non-tidal portion of the Delaware River Basin. Since the project IWTP is located in the tidal portion of the basin, the FPR do not apply to the project IWTP.

c. **Water withdrawals.** The potable water supply in the project service area is provided by wells owned and operated by the City of Chester Water Authority. The water withdrawal is described in detail in Docket No. D-1989-017 CP-1, which was approved on January 12, 1990.

d. **NPDES Permit / DRBC Docket.** NPDES Permit No. PA0051713A1 was issued by the PADEP for the existing IWTP discharge on February 19, 2008, and includes effluent limitations for a discharge of 1.15 mgd Delaware River Water Quality Zone 4. The average monthly effluent limits listed in Table A-1 below are for DRBC parameters listed in the NPDES permit and meet or are more stringent than the effluent requirements of the DRBC, and are in effect prior to the project expansion being completed, discharging from the existing outfall structure.

EFFLUENT TABLE A-1: DRBC parameters included in the current NPDES permit for existing Outfall 001, based on a flow of 1.15 mgd, in effect until the proposed new outfall and diffuser goes into operation:

Existing Outfall 001 (Delaware River Water Quality Zone 4)		
PARAMETER	LIMIT	MONITORING
pH	6 to 9 at all times	As required in the NPDES permit
Total Suspended Solids	100 mg/l (85 % minimum removal*)	As required in the NPDES permit
Total Dissolved Solids (TDS)**	30,000 mg/l (monthly avg) 287,890 lbs/day (monthly avg) 32,000 mg/l (daily max) 307,080 lbs/day (daily max)	As required in the NPDES permit
Temperature	110°F (Instantaneous Max)***	As required in the NPDES permit
Acute WET LC50 Stat 96 hr (P. promelas) ****	Monitor & Report	As required in the NPDES permit
Acute WET LC50 Stat 48 hr (C. dubia) ****	Monitor & Report	As required in the NPDES permit
Chronic WET IC25 Statre 7 day (P. promelas) ****	Monitor & Report	As required in the NPDES permit
Chronic WET IC25 Statre 7 day (C. dubia) ****	Monitor & Report	As required in the NPDES permit

* DRBC requirement

** See Condition II.y. in the DECISION section

*** The Outfall 001 discharge shall not result in violations to in-stream temperature criteria outside of the heat dissipation area approved by this docket (See Findings section and Condition II.h. in Decision section).

**** See FINDINGS section and Condition II.cc. of DECISION section of this docket

The following monitoring requirements are for DRBC parameters not listed in the NPDES permit, and are in effect until the proposed new outfall and diffuser go into operation:

EFFLUENT TABLE A-2: DRBC parameters NOT included in the current NPDES permit for existing Outfall 001, based on a flow of 1.15 mgd

Existing Outfall 001 (Delaware River Water Quality Zone 4)		
PARAMETER	LIMIT	MONITORING
Ammonia-Nitrogen	Monitor & Report	Quarterly
Fecal Coliform	Monitor & Report	Quarterly
BOD (5-Day at 20° C)	Monitor & Report *	Quarterly
CBOD (20-Day at 20° C)*	Monitor & Report *	Quarterly

* The docket holder is required to monitor and report BOD₅ and CBOD₂₀ influent and effluent. See FINDINGS section and Condition II.x. and y. of the DECISION section of this docket

The average monthly effluent limits listed in Table A-3 below are for DRBC parameters, and are in effect after the proposed new outfall and diffuser are constructed, but prior to the IWTP expansion, based on an annual average flow of 1.15 mgd.

EFFLUENT TABLE A-3: DRBC Parameters to go into effect upon completion of the proposed Outfall 001 with diffuser, based on the existing flow of 1.15 mgd

Proposed Outfall 001 (Delaware River Water Quality Zone 4)		
PARAMETER	LIMIT	MONITORING
pH	6 to 9 at all times	Daily
Total Suspended Solids	100 mg/l (85 % minimum removal)	Weekly
Total Dissolved Solids (TDS)*	30,000 mg/l (monthly avg) 287,890 lbs/day (monthly avg) 32,000 mg/l (daily max) 307,080 lbs/day (daily max)	Twice per week
Temperature	110°F (Instantaneous Max)**	Weekly
Ammonia-Nitrogen	Monitor & Report	Quarterly
Fecal Coliform	Monitor & Report	Quarterly
Acute WET LC50 Stat 96 hr (P. promelas) ***	7.5 TU _a	Quarterly
Acute WET LC50 Stat 48 hr (C. dubia) ***	7.5 TU _a	Quarterly
Chronic WET IC25 Statre 7 day (P. promelas) ***	Monitor & Report	Quarterly
Chronic WET IC25 Statre 7 day (C. dubia) ***	Monitor & Report	Quarterly
BOD (5-Day at 20° C)	Monitor & Report ****	Quarterly
CBOD (20-Day at 20° C)	Monitor & Report ****	Quarterly

* See Condition II.y. in the DECISION section

** The Outfall 001 discharge shall not result in violations to in-stream temperature criteria outside of the heat dissipation area approved by this docket (See Findings section and Condition II.h. in the DECISION section).

*** See FINDINGS section and Condition II.cc. of DECISION section of this docket

**** The docket holder is required to monitor and report BOD₅ and CBOD₂₀ influent and effluent. See FINDINGS section and Condition II.x. and y. of the DECISION section of this docket

The average monthly effluent limits listed in Table A-4 below are for DRBC parameters, and are in effect after the project expansion to 1.8 mgd has been completed. Note that the proposed new outfall and diffuser must be completed and operational prior to the IWTP annual average flow exceeding 1.15 mgd.

EFFLUENT TABLE A-4: DRBC Parameters to go into effect upon completion of the proposed Outfall 001 with diffuser and the project expansion, based on the expanded flow of 1.8 mgd

Proposed Outfall 001 (Delaware River Water Quality Zone 4)		
PARAMETER	LIMIT	MONITORING
pH	6 to 9 at all times	Daily
Total Suspended Solids	100 mg/l (85 % minimum removal)	Weekly
Total Dissolved Solids (TDS)*	30,000 mg/l (monthly avg) 450,360 lbs/day (monthly avg) 32,000 mg/l (daily max) 480,384 lbs/day (daily max)	Twice per week
Temperature	110°F (Instantaneous Max)**	Weekly
Ammonia-Nitrogen	Monitor & Report	Quarterly
Fecal Coliform	Monitor & Report	Quarterly
Acute WET LC50 Stat 96 hr (P. promelas) ***	7.5 TU _a	Quarterly
Acute WET LC50 Stat 48 hr (C. dubia) ***	7.5 TU _a	Quarterly
Chronic WET IC25 Statre 7 day (P. promelas) ***	Monitor & Report	Quarterly
Chronic WET IC25 Statre 7 day (C. dubia) ***	Monitor & Report	Quarterly
BOD (5-Day at 20° C)	Monitor & Report ****	Quarterly
CBOD (20-Day at 20° C)	Monitor & Report ****	Quarterly

* See Condition II.z. in the DECISION section

** The Outfall 001 discharge shall not result in violations to in-stream temperature criteria outside of the heat dissipation area approved by this docket (See FINDINGS section and Condition II.h. in the DECISION section).

*** See FINDINGS section and Condition II.cc. of DECISION section of this docket

**** The docket holder is required to monitor and report BOD₅ and CBOD₂₀ influent and effluent. See FINDINGS section and Condition II.x. and y. of the DECISION section of this docket

e. **Cost.** The overall cost of this project is estimated to be \$ 2,517,202.

B. **FINDINGS**

This docket approves the renewal of the discharge from the Evonik Degussa Corporation (Evonik) IWTP, which receives wastewater generated onsite from silica manufacturing and processing operations at the Evonik Chester facility. This docket also approves the modification and expansion of the existing IWTP discharge, consisting of: 1) the addition of new industrial wastewater treatment facilities; 2) the construction of a new outfall and diffuser to replace the existing, submerged vertical multi-port diffuser with a submerged horizontal, multi-port diffuser; and 3) an expansion of the average annual design capacity from 1.15 mgd to 1.8 mgd, that is supported by the proposed modifications. This docket also continues a Total Dissolved Solids (TDS) Determination of a monthly average effluent concentration limit of 30,000 mg/l and daily maximum effluent concentration limit of 32,000 mg/l.

This docket includes a compliance schedule for the construction and operation of the new outfall and diffuser. The docket holder is required to complete the construction of the new outfall and diffuser no later than January 12, 2014, and to have the new outfall and diffuser in operation by April 12, 2014. This requirement applies whether or not the docket holder proceeds with the IWTP expansion to 1.8 mgd. See Condition II.n. in the DECISION section.

The docketed effluent limits in EFFLUENT TABLES A-1 & A-2 in Section A. 4. d. of in the DESCRIPTION Section of this docket are in effect upon the docket approval date in this docket and remain in effect until the proposed new outfall goes into operation (April 12, 2014). The effluent limits in Effluent Table A-3 go into effect after the new outfall is placed in operation (April 12, 2014) and remain in effect until the proposed IWTP expansion is completed and placed in operation. The effluent limits in Effluent Table A-4 go into effect after the proposed IWTP expansion is completed and goes into operation.

The Evonik IWTP currently discharges treated industrial wastewater effluent to Delaware Water Quality Zone 4. DRBC Water Quality Regulations (WQR) include stream quality objectives for Zone 4, including criteria to protect the taste and odor of ingested water and fish (Table 4 of WQR), to protect aquatic life (Table 5), and to protect human health (Tables 6 & 7). Toxicity in effluent is measured as Whole Effluent Toxicity (WET), and results from both acute and chronic exposures. The acute toxicity stream quality objective for Zone 4 is 0.3 Toxic Units

(TUa = 0.3). The chronic toxicity stream quality objective for Zone 4 is 1.0 Toxic Units (TUc = 1.0).

Regulatory Mixing Zone (RMZ) and Associated Dilution Factor

Section 4.20.5.A.1. of the WQR states that:

“In establishing wasteload allocations and other effluent requirements, exceedances of stream quality objectives for the protection of aquatic life from acute effects may be permitted in small areas near outfall structures, provided that all of the following requirements are met:

a. As a guideline, the dimensions of the area where objectives are exceeded should be limited to the more stringent of the following structures:

- 1). A distance of 50 times the discharge length scale in any direction from the outfall structure, or*
- 2). A distance of 5 times the local water depth in any direction from the outfall structure.*

b. Stream quality objectives shall not be exceeded in areas designated as critical habitat for fish and benthic organisms.

c. Stream quality objectives shall not be exceeded where effluent flows over exposed benthic habitat prior to mixing with the receiving waters.

d. A zone of passage for free-swimming and drifting organisms equal to 50% of the surface width of the river at the location of the discharge shall be provided.

e. The total surface area of the Delaware River Estuary where stream quality objectives for the protection of aquatic life from acute effects are exceeded shall be limited to: 5% of the total surface area of Zone 5.”

The discharge length scale referred to in Item a. above is defined in Section 4.20.5.B.2. of the WQR as the square root of the discharge cross-sectional area. The new 32.8-foot long (10-meter long) submerged multi-port diffuser will be oriented perpendicular to the shoreline, and includes a total of three (3) ports, spaced 16.4 feet (5 meters) apart. Port diameter is 5 inches (0.4167 feet). For the new diffuser discharge, the discharge cross-sectional area is 0.136 ft² per port. The local water depth is 14.5 ft (4.4 meters). The resulting dimensions for the guideline mixing zone, referred to as the regulatory mixing zone, or RMZ, are calculated as the more stringent of:

- 1). $50 * (\sqrt{0.136}) = 18.5 \text{ ft (5.6 meters)}$
- or
- 2). $5 * 14.5 = 72.5 \text{ ft (22.1 meters)}$

The controlling dimension is the discharge length scale, and therefore the RMZ for the new outfall and diffuser is a radius of 18.5 feet (5.6 meters) about each port. The total regulatory mixing area for the entire diffuser is the rectangular area formed by the radii around the ports; dimensions are 36 feet (11.2 meters) in length by 69 feet (21.0 meters) in width, equating to an area of approximately 2,500 ft² (or 235 meter²).

Upon review of the modeling work on the modified outfall / new diffuser configuration submitted by the docket holder with the amended Application dated April 4, 2012, DRBC staff concludes that under existing flow conditions (hydraulic design capacity of 1.15 mgd), a dilution factor of 8.4:1 at the edge of the RMZ (5.6 meters around each port) would be achieved based on DRBC's interpretation of its regulations. Under proposed expanded flow conditions (hydraulic design capacity of 1.8 mgd), a dilution factor of 8.3:1 at the edge of the RMZ would be achieved based on DRBC's interpretation of its regulations.

Evaluation of Stream Quality Objectives and Effluent Quality

The amended Application included an analysis demonstrating the dilution factor and mixing zone within which compliance with the applicable water quality criteria would be achieved for Acute WET. Based on quarterly acute toxicity data from 2007 - 2011 provided by the docket holder, it was determined that the discharge would need to achieve a dilution factor of 25 to 1 at the edge of the RMZ after consideration of tidal build-up, in order to meet DRBC's in-stream water quality criteria for acute WET. Not accounting for the adjustment for the tidal build-up, a dilution factor of 26.2 to 1 is required.

Alternative Mixing Zone (AMZ) Request

Section 4.20.5.A.1.f. of the Commission's WQR, as follows, provides that the docket holder may request an alternative mixing zone (AMZ):

"Upon the request of one or more dischargers, the Executive Director may consider requests for alternatives to the requirements of subsections a. through e. of Section 4.20.5.A.1. Such requests shall provide a demonstration that the alternative requirement requested will not adversely impact free-swimming, drifting and benthic organisms. The demonstration(s) shall provide a sound rationale, and be supported by substantial scientific data and analysis. The methodology and form of the demonstration shall be approved by the Executive Director. The Executive Director may reject any requests which are not substantive. The Commission may establish alternative areas where acute stream quality objectives may be exceeded based upon the evaluation of submitted demonstrations."

As indicated in Section 4.20.5.A.1. of the WQR, the Commission may establish alternative areas (Alternative Mixing Zone, or AMZ) within which exceedances of stream quality objectives for the protection of aquatic life from acute effects may be permitted. Where the Commission approves an AMZ, the size of the AMZ and the associated dilution factor shall

be the minimum necessary in order for the discharger to meet the in-stream water quality criteria at the edge of the AMZ, based on available historical, current, and future projected effluent data.

Evonik requested an AMZ for acute WET in their April 4, 2012 amended Application (see HydroQual's modeling study and IES Engineers' report submitted with the Application). Evaluation and justification of the need for an AMZ are described in the section below.

Alternative Mixing Zone and Associated Dilution Factor

Based upon information and evaluations submitted by the docket holder and Commission staff's findings and analyses, Commission staff calculated the AMZ for acute WET that will not cause exceedances of the acute WET water quality criterion (0.3 TU_a) at the edge of the AMZ, for a dilution factor of 25 to 1 accounting for tidal build-up correction. The dimensions of the AMZ required to achieve a dilution factor of 25 to 1 under existing flow conditions (1.15 mgd) are 102 feet (31.1 meters) by 69 feet (21.0 meters), equating to an area of approximately $7,000 \text{ ft}^2$ (650 meters^2). The same width of mixing area is maintained for the AMZ request. This AMZ is approximately 2.8 times larger than the RMZ ($2,500 \text{ ft}^2$ or 235 meter^2). (See Condition II.j. in the DECISION section).

The dimensions of the AMZ required to achieve a dilution factor of 25 to 1 under proposed expanded flow conditions (1.8 mgd) are 128 feet (39.0 meters) by 69 feet (21.0 meters), equating to an area of approximately $8,800 \text{ ft}^2$ (820 meters^2). This AMZ is approximately 3.5 times larger than the RMZ ($2,500 \text{ ft}^2$ or 235 meter^2). (See Condition II.j. in the DECISION section).

Evonik will conduct acute WET testing of its effluent in accordance with the Effluent Tables contained in the DESCRIPTION section of this docket.

Acute and Chronic Whole Effluent Toxicity Monitoring

The docket holder is required to perform quarterly WET tests to generate acute and chronic toxicity data on the cladocera (*Ceriodaphnia dubia*) and the fathead minnow (*Pimephales promelas*) for the first two (2) years of the docket cycle. The results shall be reported as No Observed Effect Concentration (NOEC) and Chronic Toxic Units (TU_c) with a Percent Minimum Significant Difference (PMSD) reported. The results shall also be reported as Inhibitory Concentration, 25 percent (IC_{25}). After completing eight (8) acceptable paired toxicity tests, the docket holder may request in writing to the Executive Director that testing be limited to the most sensitive species. After two (2) years, the docket holder may also request that the testing frequency be reduced based on the results. In lieu of conducting separate acute and chronic toxicity tests, the docket holder may utilize the survival data from chronic toxicity tests to calculate 48-hour and 96-hour LC_{50} . The 48-hour and 96-hour LC_{50} data and Acute Toxic Units (TU_a) shall also be reported with the chronic toxicity results. The testing should follow USEPA guidance on Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. (See Condition II.cc. in the DECISION section).

Determination of a Heat Dissipation Area for the Proposed New Outfall

Section 4.30.6.C. of the Commission's WQR require that discharges to Zone 5 shall not result in an induced temperature increase of more than 5°F above the average 24-hour temperature gradient displayed during the 1961-1966 period, or a maximum of 86°F (30°C), whichever is less, which temperatures shall be measured outside of designated heat dissipation areas as described in 4.30.6.F of the WQR.

Based on a mass balance calculation, dilution factors ranged from 5.8 to 14.8 to 1 are required in order for Section 4.30.6.C. of the Commission's WQR to be maintained as a result of heated discharge of 110°F. The highest dilution factor of 14.8 to 1 is required to maintain February ambient water temperature. A heat dissipation area approximately 33 feet (10 meters) upstream and 33 feet (10 meters) downstream of the diffuser ports is required to achieve this dilution factor of 14.8 to 1 for the existing flow (1.15 mgd) with the new diffuser. The calculated heat dissipation area is 66 feet (20 meters) in length and 37 feet (11.3 meters) in width, equating to a total area of approximately 2,500 ft² (225 meter²).

A heat dissipation area approximately 41 feet (12.5 meters) upstream and 41 feet (12.5 meters) downstream of the diffuser ports is required to achieve this dilution factor of 14.8 to 1 for the expanded flow (1.8 mgd) with the new diffuser. The calculated heat dissipation area is 83 feet (25.3 meters) in length and 38 feet (11.6 meters) in width, equating to a total area of approximately 3,150 ft² (295 meter²). Section 4.30.6.C. of the Commission's WQR shall be maintained at the edge of this heat dissipation area (See Condition II.h. in the DECISION section).

CBOD₂₀ Wasteload Allocation

The Commission's WQR provide for the allocation of the stream assimilative capacity where waste discharges would otherwise result in exceeding such capacity. It was determined in the late 1960's that discharges to the Delaware Estuary be limited to a total of 322,000 lbs/day of carbonaceous biochemical (first stage) oxygen demand (CBOD₂₀). In accordance with the WQR, the assimilative capacity of each Delaware Estuary zone minus a reserve was originally allocated in 1968 among the individual dischargers based upon the concept of uniform reduction of raw waste in a zone (DRBC Water Quality Zones 2, 3, 4 and 5). The totals and percent reduction for each zone are given in Table 1 of the Commission's *Status of CBOD₂₀ Wasteload Allocations* (Revised October 1, 2000). The Evonik IWTP is located in Zone 4 at River Mile 82.2. The DRBC has assigned Zone 4 with a total CBOD₂₀ capacity of 91,000 lbs/day and requires a minimum percent removal requirement of CBOD₂₀ of 89.25%. The docket holder has indicated that it does not discharge CBOD₅ and CBOD₂₀. To confirm this, the docket requires the docket holder to monitor CBOD₅ and CBOD₂₀ on a quarterly basis and to report the results to the Executive Director on an annual basis in accordance with Condition II.x. in the DECISION section of this docket. Based on the results of the monitoring, the Commission will determine if a CBOD₂₀ effluent limit and allocation is required and DRBC staff may assign a load allocation to the docket holder upon next docket renewal.

CBOD₂₀ Monitoring

The docket holder may request to establish a ratio between BOD₅ and CBOD₂₀ in order to reduce the required monitoring for CBOD₂₀ contained in the EFFLUENT TABLES in Section A.4.d. of this docket. The docket holder shall submit the request in writing to the Executive Director along with historical influent and effluent data for BOD₅ and CBOD₂₀ used to establish the ratio. Upon review, the Executive Director may modify the docket to require only BOD₅ monitoring or reduce the CBOD₂₀ monitoring frequency required within this docket (See Condition II.x. in the DECISION Section).

Total Dissolved Solids (TDS) Effluent Limit Determination

The Commission's basin-wide TDS effluent limit is 1,000 mg/l (Section 3.10.4.D.2. of the Commission's WQR). In addition the Commission's basin-wide regulations require that the effluent not result in an in-stream TDS that is 1) greater than 133% of the background (Section 3.10.3.B.1.b. of the Commission's WQR), or 2) a receiving stream's resultant TDS concentration of 500 mg/l or more (Section 3.10.3 B.2. of the Commission's WQR).

The 133% of the background TDS requirement is for the protection of aquatic life. The 500 mg/l TDS requirement is to protect the use of the receiving stream as a drinking water source. The EPA's Safe Drinking Water Act's secondary standard for TDS is 500 mg/l.

Water Quality Zone 4 is not designated for public water supply use. As a consequence, the Commission does not always apply the 500 mg/l basin-wide TDS requirement in Water Quality Zone 4. The Commission reserves the right, in accordance with the WQR and the *Rules of Practice and Procedure*, to apply the 500 mg/l basin-wide TDS requirement in Water Quality Zone 4 when and where it determines that the requirements are necessary to protect water uses.

Docket No. D-1996-011-2 was approved by the DRBC on September 27, 2006 for the Evonik IWTP discharge. The docket approved a monthly average effluent concentration limit of 30,000 mg/l and daily maximum effluent concentration limit of 32,000 mg/l, corresponding to a monthly average load limit of 287,890 lbs/day and daily maximum effluent load limit of 307,080 lbs/day, respectively, based on a flow of 1.15 mgd. These limits are included in the current NPDES permit for the IWTP. The docket holder included in their April 4, 2012 amended Application a request to continue the monthly average effluent concentration limit of 30,000 mg/l and daily maximum effluent concentration limit of 32,000 mg/l to be applied to the expanded flow of 1.8 mgd. The resultant monthly average and daily maximum load limits based on a flow of 1.8 mgd and the monthly average and daily maximum effluent concentration limits of 30,000 mg/l and 32,000 mg/l are 450,360 lbs/day and 480,384 lbs/day, respectively.

Background TDS concentration of the Delaware River at the River Mile 82.2 (Evonik outfall) varies as a result of tidal influence and variations in freshwater contributions to the Delaware River estuary. During times of high freshwater flow, background in-stream TDS concentration can drop down below 200 mg/l. During times of low freshwater contribution, TDS can exceed 1,000 mg/l at the Evonik outfall. The 133% of the background TDS requirement is for the protection of aquatic life. The in-stream flow at which background TDS is to be

determined is the minimum consecutive 7-day flow with a 10-year recurrence interval (referred to as the Q_{7-10} flow). As stated above, background in-stream TDS concentration can drop down below 200 mg/l during times of high freshwater flow; therefore the 200 mg/l background condition would not be the appropriate condition in order to evaluate the required TDS mixing zone, since the 200 mg/l would occur at times of higher flow. Although background TDS may approach or exceed 1,000 mg/l at times of low flow, using 1,000 mg/l background condition may overestimate TDS concentration in Zone 4 during certain times in the tidal cycle, resulting in a less conservative analysis. Therefore, an in-stream TDS concentration of 500 mg/l (approximately 90th percentile) was used as the background condition in this analysis.

DRBC staff evaluated analyses results provided by the applicant on the existing and expanded flow conditions at the maximum TDS concentration of 32,000 mg/l. Under the maximum TDS effluent concentration of 32,000 mg/l, a dilution factor of 191 to 1 after correction for the tidal built-up is required at the edge of the TDS mixing zone to meet the 133 percent of TDS background concentration of 500 mg/l. Not accounting for the adjustment for the tidal-build-up, a dilution factor of 301 to 1 is required. The final TDS mixing zone is determined based on superimposition of required areas over a tidal cycle.

Under the existing flow conditions of 1.15 mgd @ TDS concentration of 32,000 mg/l, the required, averaged TDS mixing zone over a tidal cycle to meet 133 percent of TDS background concentration of 500 mg/l is 769 feet (234 meters) long by 68 feet (21 meters) wide, which equates to 1.20 acres. The maximum TDS mixing zone of 517 feet (158 meters) in both directions of the new outfall and diffuser for a total length of 1,033 feet (315 meters) by 97 feet (30 meters) wide is required to achieve the required dilution factor of 191 to 1. This docket approves a TDS mixing zone of 1,033 feet long by 97 feet wide for the new outfall and diffuser at a flow of 1.15 mgd, for a total area of 100,227 ft² (2.30 acres). At the edge of this TDS mixing zone, the required dilution factor of 191 to 1 will be achieved throughout a tidal cycle and 133 percent of background TDS concentration of 500 mg/l will be maintained.

Under the proposed expanded flow conditions of 1.8 mgd @ TDS concentration of 32,000 mg/l, the required, averaged TDS mixing zone over a tidal cycle to meet 133 percent of TDS background concentration of 500 mg/l is 844 feet (257 meters) long by 73 feet (22 meters) wide, which equates to 1.42 acres. The maximum TDS mixing zone of 504 feet (154 meters) in both directions of the new outfall and diffuser for a total length of 1,007 feet (307 meters) by 117 feet (36 meters) wide is required to achieve the required dilution factor of 191 to 1. This docket approves a TDS mixing zone of 1,007 feet long by 117 feet wide for the new outfall and diffuser at a flow of 1.8 mgd, for a total area of 117,971 ft² (2.71 acres). At the edge of this TDS mixing zone, the required dilution factor of 191 to 1 will be achieved throughout a tidal cycle and 133 percent of background TDS concentration of 500 mg/l will be maintained.

This docket continues the monthly average TDS effluent concentration limit of 30,000 mg/l and daily maximum TDS effluent concentration limit of 32,000 mg/l, under existing and proposed expanded flow conditions. This docket also continues the approval of the monthly average load limit of 287,890 lbs/day and daily maximum effluent load limit of 307,080 lbs/day under existing conditions, based on a flow of 1.15 mgd. Additionally, this docket approves the monthly average load limit of 450,360 lbs/day and daily maximum effluent load limit of 480,384

lbs/day under proposed expanded flow conditions, based on a flow of 1.8 mgd. See EFFLUENT TABLES A-1, A-3 and A-4 in Section A.4.d of this docket. Although the discharge exceeds DRBC's basin-wide TDS effluent limit of 1,000 mg/l, DRBC staff determined the discharge to be compatible with the Commission's designated water uses and water quality objectives in conformance with DRBC Water Quality Regulations since the in-stream concentrations in the Delaware River are not expected to exceed the Commission's criteria of 133% of background outside the relatively small TDS mixing zones described above. See Conditions II.k. and II.y. in the DECISION section of this docket.

PCBs

The docket holder is required to monitor for 209 PCB congeners using Method 1668A one time per year during dry weather at existing and proposed Outfall No. 001 and implement Pollution Minimization Plans (PMPs) for PCBs as required in the NPDES Permit (See Condition II.aa. in the DECISION section of this docket).

The project is designed to produce a discharge meeting the effluent requirements as set forth in the *Water Quality Regulations* of the DRBC.

There are no public water supply intakes downstream of the project discharge.

The project does not conflict with the Comprehensive Plan and is designed to prevent substantial adverse impact on the water resources related environment, while sustaining the current and future water uses and development of the water resources of the Basin.

C. DECISION

I. Effective on the approval date for Docket No. D-1996-011-3 below, Docket No. D-1996-011-2 is terminated and replaced by Docket No. D-1996-011-3.

II. The project and appurtenant facilities as described in the Section entitled "Physical features" above are approved pursuant to Section 3.8 of the *Compact*, subject to the following conditions:

a. Docket approval is subject to all conditions, requirements, and limitations imposed by the PADEP in its NPDES permit and Part II Permit, and such conditions, requirements, and limitations are incorporated herein, unless they are less stringent than the Commission's. Commission approval of the proposed IWTP expansion and treatment facilities construction is contingent on the PADEP's approval of the NPDES permit and Part II permit.

b. The facility and operational records shall be available at all times for inspection by the DRBC.

c. The facility shall be operated at all times to comply with the requirements of the Commission's WQR.

d. The docket holder shall comply with the requirements contained in the Effluent Tables A-1 and A-2 in Section A.4.d. of this docket. After the completion of the project expansion with associated treatment facilities, the docket holder shall comply with the requirements contained in the Effluent Table A-3 in Section A.4.d. of this docket. The docket holder shall submit the required monitoring results directly to the DRBC Project Review Section. The monitoring results shall be submitted annually, absent any observed limit violations, by January 31. If a DRBC effluent limit is violated, the docket holder shall submit the result(s) to the DRBC within 30 days of the violation(s) and provide a written explanation that states the action(s) the docket holder has taken to correct the violation(s) and protect against any future violations.

e. Except as otherwise authorized by this docket, if the docket holder seeks relief from any limitation based upon a DRBC stream quality standard or minimum treatment requirement, the docket holder shall apply for approval from the Executive Director or for a docket revision in accordance with Section 3.8 of the *Compact* and the *Rules of Practice and Procedure*.

f. If at any time the receiving treatment plant proves unable to produce an effluent that is consistent with the requirements of this docket approval, no further connections shall be permitted until the deficiency is remedied.

g. Nothing herein shall be construed to exempt the docket holder from obtaining all necessary permits and/or approvals from other State, Federal or local government agencies having jurisdiction over this project.

h. The discharge of wastewater shall not increase the ambient temperatures of the receiving waters by more than 5°F above the average 24-hour temperature gradient displayed during the 1961-1966 period, nor shall such discharge result in stream temperatures exceeding 86°F (except within an assigned heat dissipation area consisting of 2,500 ft² under existing flow conditions of 1.15 mgd and 3,150 ft² under proposed expanded flow conditions of 1.8 mgd).

i. This docket approves a regulatory mixing zone (RMZ) for acute criteria consisting of a radius of 18.5 ft (5.6 meters) around the end of the each of the three (3) ports on the proposed new outfall pipe diffuser, equal to a total regulatory mixing zone (RMZ) area for the new outfall of 2,500 ft² (235 m²). The critical one hour dilution factor at the edge of the RMZ is 8.4 to 1 under the existing flow conditions of 1.15 mgd and 8.3 to 1 under the proposed expanded flow conditions of 1.8 mgd.

j. This docket approves two (2) alternative mixing zones (AMZs) for acute WET criteria for the proposed new outfall: 1) under existing flow conditions of 1.15 mgd; and 2) under proposed expanded flow conditions of 1.8 mgd. The dimensions of the AMZ required to achieve a dilution factor of 25 to 1 under existing flow conditions (1.15 mgd) are 102 feet (31.1 meters) by 69 feet (21.0 meters), equating to an area of 7,000 ft² (650 meters²). The dimensions of the AMZ required to achieve a dilution factor of 25 to 1 under proposed expanded flow conditions (1.8 mgd) are 128 feet (39.0 meters) by 69 feet (21.0 meters), equating to an area of 8,800 ft² (820 meters²). The critical one hour dilution factor at the edge of the AMZs under the

existing flow conditions of 1.15 mgd and the proposed expanded flow conditions of 1.8 mgd approved by this docket is 25 to 1.

k. This docket approves a Total Dissolved Solids (TDS) mixing zone of 1,033 feet long by 97 feet wide for the new outfall and diffuser under existing flow conditions (1.15 mgd), for a total area of 100,227 ft² (2.30 acres). This docket approves a Total Dissolved Solids (TDS) mixing zone of 1,007 feet long by 117 feet wide for the new outfall and diffuser under proposed expanded flow conditions (1.8 mgd), for a total area of 117,971 ft² (2.71 acres).

l. Sound practices of excavation, backfill and reseedling shall be followed to minimize erosion and deposition of sediment in streams.

m. Within 10 days of the date that construction of the project has started, the docket holder shall notify the DRBC of the starting date and scheduled completion date.

n. The docket holder will construct the new outfall and diffuser as described in Section A.4.b. (Facilities) and the Section B.(Findings) of this docket. Subject to the receipt of all necessary permits and approvals, and assuming no delays beyond the docket holder's control, the construction of the new outfall and diffuser shall be completed no later than January 12, 2014. The new outfall and diffuser shall be placed in operation by April 12, 2014. This requirement applies regardless of whether or not the docket holder proceeds with the proposed IWTP expansion and associated treatment facilities construction.

o. Within 30 days of completion of construction of the approved project, the docket holder is to submit to the attention of the Project Review Section of DRBC a Construction Completion Statement ("Statement") signed by the docket holder's professional engineer for the project. The Statement must (1) either confirm that construction has been completed in a manner consistent with any and all DRBC-approved plans or explain how the as-built project deviates from such plans; (2) report the project's final construction cost as such cost is defined by the project review fee schedule in effect at the time the application was made; and (3) indicate the date on which the project was (or is to be) placed in operation. In the event that the final project cost exceeds the estimated cost used by the docket holder to calculate the DRBC project review fee, the statement must also include (4) the amount of any outstanding balance owed for DRBC review. The outstanding balance will equal the difference between the fee paid to the Commission and the fee calculated on the basis of the project's final cost, using the formula and definition of "project cost" set forth in the DRBC's project review fee schedule in effect at the time application was made.

p. The project expansion (including modifications to the IWTP) shall be completed within three years of approval of this docket or the docket holder shall demonstrate to the Executive Director that it has expended substantial funds (in relation to the cost of the project) in reliance upon this docket approval. If the project expansion has not been completed within three years of Docket Approval and the docket holder does not submit a cost analysis demonstrating substantial funds have been expended, Commission approval of the project expansion shall expire. If the docket expires under this condition, the docket holder shall file a

new application with the Commission and receive Commission approval prior to initiating construction of any modifications.

q. The docket holder is permitted to treat and discharge wastewaters as set forth in the Area Served Section of this docket, which incorporates by reference Sections B (Type of Discharge) and D (Service Area) of the docket holder's Application to the extent consistent with all other conditions of this DECISION Section.

r. The docket holder shall make wastewater discharge in such a manner as to avoid injury or damage to fish or wildlife and shall avoid any injury to public or private property.

s. Nothing in this docket approval shall be construed as limiting the authority of DRBC to adopt and apply charges or other fees to this discharge or project.

t. The issuance of this docket approval shall not create any private or proprietary rights in the waters of the Basin, and the Commission reserves the right to amend, suspend or rescind the docket for cause, in order to ensure proper control, use and management of the water resources of the Basin.

u. Unless an extension is requested and approved by the Commission in advance, in accordance with paragraph 11 of the Commission's Project Review Fee schedule (Resolution No. 2009-2), the docket holder is responsible for timely submittal of a docket renewal application on the appropriate DRBC application form at least 12 months in advance of the docket expiration date set forth below. The docket holder will be subject to late charges in the event of untimely submittal of its renewal application, whether or not DRBC issues a reminder notice in advance of the deadline or the docket holder receives such notice. In the event that a timely and complete application for renewal has been submitted and the DRBC is unable, through no fault of the docket holder, to reissue the docket before the expiration date below (or the later date established by an extension that has been timely requested and approved), the terms and conditions of the current docket will remain fully effective and enforceable against the docket holder pending the grant or denial of the application for docket approval.

v. The Executive Director may modify or suspend this approval or any condition thereof, or require mitigating measures pending additional review, if in the Executive Director's judgment such modification or suspension is required to protect the water resources of the Basin.

w. Any person who objects to a docket decision by the Commission may request a hearing in accordance with Article 6 of the Rules of Practice and Procedure. In accordance with Section 15.1(p) of the Delaware River Basin Compact, cases and controversies arising under the Compact are reviewable in the United States district courts.

x. The docket holder will monitor and report CBOD₅ and CBOD₂₀ influent and effluent on a quarterly basis in accordance with EFFLUENT TABLES A-2, A-3, and A-4 in the DESCRIPTION section of this docket and report the results to the Executive Director on an annual basis in accordance with Condition II.d. above. Based on the results of the monitoring the Commission will determine if a CBOD₂₀ effluent limit and allocation is required.

y. Upon demonstration of a consistent ratio between BOD₅ and CBOD₂₀, the docket holder may request in writing that the Executive Director approve the monitoring of BOD₅ only. Upon review, the Executive Director may modify the docket to reduce or eliminate the CBOD₂₀ monitoring requirements contained in the EFFLUENT TABLES in Section A.4.d. of this docket.

z. The docket holder may request of the Executive Director in writing the substitution of specific conductance for TDS. The request should include information that supports the effluent specific correlation between TDS and specific conductance. Upon review, the Executive Director may modify the docket to allow the substitution of specific conductance for TDS monitoring.

aa. The docket holder is prohibited from treating/pre-treating any hydraulic fracturing wastewater from sources in or out of the Basin at this time. Should the docket holder wish to treat/pre-treat hydraulic fracturing wastewater in the future, the docket holder will need to first apply to the Commission to renew this docket and be issued a revised docket allowing such treatment and an expanded service area. Failure to obtain this approval prior to treatment/pre-treatment will result in action by the Commission.

bb. The docket holder shall continue to submit monitoring data and PMP Annual Reports to the Commission's Modeling, Monitoring and Assessment Branch as required in the existing NPDES Permit.

cc. The docket must perform quarterly Whole Effluent Toxicity (WET) testing in accordance with EFFLUENT TABLES A-1, A-3, and A-4 and the FINDINGS section of this docket. After completing eight (8) acceptable paired toxicity tests, the docket holder may request in writing to the Executive Director that testing be limited to the most sensitive species and the docket holder may also request that the testing frequency be reduced based on the results.

BY THE COMMISSION

DATE APPROVED:

EXPIRATION DATE: September 12, 2017